LETTERS TO THE EDITOR.

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On the Secondary Radiation due to the γ Rays of Radium.

IN a recent communication to the *Annalen der Physik* (4 and 5, 1904), Paschen described experiments showing that a thick lead block containing radium emits negatively electrified particles which can be deviated in a magnetic field. He concluded that he had deflected the γ rays, thus differing from previous experimenters.

I have found that particles having a negative charge are projected, and are readily deflected magnetically. However, these are not γ rays, but differ from them inasmuch as they are completely absorbed by about a millimetre of lead.

In order to prove this, an electroscope with a thin aluminium face was mounted on a lead platform (1·2 cm. thick) above a block of lead 10 cm. high, at the centre of which was placed 30 mg. of radium. On applying a magnetic field to bend the rays towards the electroscope, the electroscope readings were doubled, but this increase was reduced to half value by a screen of lead (0·1 mm. thick) placed in front of the aluminium face. Since negatively charged particles are thus projected from the lead surface, it is clear that, as Paschen observed, a block of lead, placed in a vacuum and well insulated, would acquire a positive charge, and would continue to do so as long as the radium emitted γ rays, even if these penetrated two or three inches of lead.

The effect which Paschen observed was due not to the primary γ rays, but to the diffuse secondary radiation caused by the γ rays in the lead. This may be shown to be mainly a surface effect, for the secondary radiation from a greater depth than one or two millimetres is absorbed by the lead itself. The curvature of the rays, necessarily implied by Paschen's second experiment, is so large that other experimenters could not have failed to detect it by direct methods had the effect been due to γ primary rays.

This deflection of γ secondary radiation by a magnetic field is similar to Becquerel's result, obtained photographically, when he deflected the β secondary rays. Curie and Sagnac have also shown that Röntgen rays striking a metal cause it to emit negative electricity and to acquire a positive charge; Dorn has proved that such rays can be deflected by a magnet.

Any experiment designed to prove that the primary γ rays can be affected by a magnetic field must involve evidence that the effect produced is not due to the easily deviated γ secondary radiation. A. S. EVE.

McGill University, Montreal, August 22.

A Source of the Ionisation of the Atmosphere.

IT is perhaps not very generally known that human breath has a considerable power of discharging an electrified conductor. This fact can be strikingly shown by an experiment easily carried out. If the discharging knobs of a Wimshurst electrical machine are drawn apart so far that a spark just refuses to pass, then on breathing across the gap the spark is instantly precipitated.

The discharging power of the breath is more conclusively demonstrated, however, by breathing through a metal tube into which an insulated metal rod projects axially, the insulation of the rod being out of reach of the breath. If the rod is connected to the cap of a graduated gold-leaf electroscope, comparative observations show that the rate of discharge of the electrified rod and gold leaves is 60 per cent. to 70 per cent. greater when air from the lungs is passing through the tube than when ordinary air fills it. Again, the rate of leak of a charged electroscope in a small, badly ventilated class-room, was found to be 50 per cent. more rapid when the room was full of students than when it was empty. Incidentally, this explains in part why experiments on electrostatics are often troublesome to carry out in a room crowded with a large audience.

The point of interest, however, in these experiments is the fact that the slow low-temperature combustion going on in the lungs ionises the air in the same way as the rapid high-temperature combustion of flames. And if this slow ionisation of the air can take place in the lungs of living animals, it may also go on less markedly in the chemical interaction between the air and living plants, and in some cases between the air and inorganic matter, at ordinary temperatures, so that there is here a continual source of atmospheric ionisation apart from any possible radio-active processes. J. R. ASHWORTH.

Rochdale, August 27.

Celtic Place-names.

THE review of Mr. Johnston's "Place-names of Scotland" in your number of July 28 explains a problem that has been for a long time a puzzle to me in reference to the existence in County Leitrim alone, of the thirty-two counties in Ireland, of the word "allt" in common parlance.

To North Leitrim there came over from Stirlingshire about the year 1608, as followers and soldiers of Sir Frederick Hamilton, grandson of the second Earl of Arran, a strong Scotch colony. From them we took in a great measure our English or Scotch-English. Here is a trace of it. A half-dozen others of our distinctive Leitrimisms I have already traced back to Scotland; others to elsewhere.

In odd words and odd uses of them, and in odd pronunciations, are found "helpful and interesting sidelights for the historian" (to use the reviewer's expression) all through Ireland. Indeed, the "Irish plantations," and the parts of England and of Scotland the planters came from, might be plotted out by a careful observation of such peculiarities. They are disappearing. Before it is too late, or it becomes too difficult, it would be well worth while for someone who knows the rural districts of both countries intimately to attempt the task. It should well repay the historian or the philologist. I have been trying something like it, but I have had slight opportunity for making the acquaintance of any English dialects except the Yorkshire and the Lancashire, and I cannot accordingly push it very far.

I have to thank the reviewer; but permit me to say that the Leitrim use of "allt" (or "alt") corresponds rather with that given by Mr. Johnston than with that claimed by him. With us an "alt" is not "a streamlet passing through a ravine," but a narrow, deep glen or hollow through which, as a rule, of course, a stream or streamlet flows; but that a stream should do this is not essential for the chasm to be so termed. Joyce, too, would support this. The word *alt*, he states ("Irish Names of Places," p. 353, 1869 edition), is found in townland names in Ireland, and in its topographical application it is generally understood to mean a cliff or the side of a glen.

I should be much interested in knowing if Mr. Johnston would subscribe to our precise application of the word. It is evidently a primitive word of Aryan origin. The meaning of all allied words in any language I am familiar with favours our interpretation, and it is hard to see how it could come by the meaning of "streamlet," however flowing. JOSEPH MEEHAN.

Creevelea, Drumkeeran, Co. Leitrim, August 5.

I HAVE read with much interest your correspondent's letter, and can well understand his difficulty with regard to the Scottish usage of the word *allt*. Here it is applied, as I have stated, to a stream passing through a ravine or hollow; never, so far as I am aware, to a glen or dry chasm.

The Irish *alt*, which is slightly different in spelling, is also apparently different in application. Your correspondent may be interested in the various Celtic usages of the word as given by Dr. Macbain in his "Etymological Dictionary of the Gaelic Language":

"Allt, a stream; Ir. alt, height, (topographically) glen-side or cliff; O. Ir. alt, shore, cliff; O. W. allt, cliff; Cor. als; Br. aot, shore, all allied to Lat. altus. The Gaelic form and meaning are possibly of Pictish origin."

Looking down or up the precipitous sides of many a

mountain stream, it is not hard to see how this epithet came to be associated with, and applied to, the stream itself, which is not regarded apart from its peculiar surroundings. The steep sides are, in fact, the characteristic feature of the ordinary Highland *allt*. THE REVIEWER.

The Striped Hawk-Moth.

WITH reference to the paragraph in NATURE of August 18 (p. 389) on the striped hawk moth, on May 23 this year I found a specimen alive in a thick bed of lily-of-the-valley; it had just emerged, and had never flown. Warmwell is two miles from the sea as the crow flies; possibly the parent was a migrant, but the moth I found had passed through its metamorphosis in this country. The insect lived twelve hours after capture, and is now in the collection of Mr. O. Picard-Cambridge, of Bloxworth.

Warmwell, Dorchester. ROSE HAIG THOMAS.

Mountains and Mankind.

I SHALL be obliged if you will allow me to correct the following errata in my address to Section E of the British Association. For "Watson" and "Tokio" read Weston and Kobi (p. 429, column 2).

September 5. DOUGLAS W. FRESHFIELD.

[The errors occur in the copy of the address reprinted in NATURE.—EDITOR.]

BRITISH CHEMICAL EXHIBIT AT THE ST. LOUIS EXHIBITION.[1]

THE Royal Commission appointed to arrange the British exhibits for the St. Louis Exhibition have evidently, from the catalogue before us, carried out their difficult task with great care and in a most successful manner. We would that all catalogues were written in the extremely interesting and vivid style of the one to which we have referred. The products treated of in the catalogue are drawn up in alphabetical order, and at the end of the description of each substance, or group of substances, the names of the exhibitors are placed; the exhibitors are also arranged in alphabetical order at the end of the book.

The catalogue is written in the form of a history of the various manufacturing processes described therein. First and foremost we come to a most interesting and detailed account of the alkali industry, from the time of its inception to the present day. The reader is carried historically through the building up of the Le Blanc process—and the tragic fate of Le Blanc, its founder—the ammonia soda process, Chance's sulphur recovery process, and so on. Many details, which are not the common property of text-books, as to the difficulties and failures and final success are included, which makes the narrative of exceptional interest. Before Solvay's time, several patents had been taken out which embodied the principles of his ammonia soda process, but he, unaware that others had worked upon the subject, experimented and patented the process, and we are shown in his own words what a blow he received on discovering that he was not the first in the field:—

"What was our astonishment in discovering . . . I was no longer the inventor of the reaction and its industrial use had already tempted other investigators. It was a hard blow to me."

Here the narrator intervenes with the pertinent words: "Happily Solvay was young," and finally success attended his efforts. In so far as the ammonia soda process affects the British exhibits, we have to thank the indefatigable energy of Dr. Mond.

As a natural sequence the manufacture of sulphuric acid is treated of in the same section as that devoted to the alkali industry, and after being informed that sulphuric acid was first made by Ward at Richmond in 1740, we are taken through the gradual development of the chamber process, and then introduced to the contact process, which may be said to have been originally founded on an experiment of Humphrey Davy in 1817.

The section on alum is very interesting, and one notices how greatly manufacturers in this country are indebted to the acumen of Peter Spence, of Manchester.

One of the most interesting and suggestive sections is that dealing with the coal-tar products. In his report on the 1862 Exhibition, Hofmann spoke with sanguine eloquence of the bright prospects before the coal-tar colour industry in this country. The brilliant anticipations which Hofmann made for England have, alas! not been substantiated, for where we have sown others have reaped. The writer of this section endeavours to trace some of the causes which underlie the loss of the colour industry to England—such as the inadequate patent laws, want of research, which really means want of sufficient capacity for looking ahead.

To the electrochemical industry are devoted nine pages of the catalogue, which, commencing with an historical survey of the foundation of electrochemistry, passes on to deal with hypochlorites, chlorates, caustic alkali, and sodium. Then follows a description of the copper refining processes, and on p. 87 we are told that other metals, such as gold and silver, have been purified by electrolytic processes. As these have not been done in the United Kingdom, this is evidently in the nature of a hint to British electrochemists. A passing reference is made to the manufacture of calcium carbide, which, we regret to say, is at present not manufactured in this country.

We have only picked out a few of the subjects treated of in the catalogue; there are, of course, many others, such, for example, as explosives, the candle industry, soap, oils and colours, and so on.

There are also a good many scientific exhibits, among which may be noted Sir James Dewar's low temperature research exhibit, in which the complete plant, as employed at the Royal Institution for the production of liquid and solid hydrogen, is shown. Photographs of spectra by Mr. E. C. C. Baly, exhibits from the Lister Institute of Preventive Medicine, also a very complete exhibit from the Wellcome Research Laboratories, and many others which space forbids us to mention.

We do not know whether the catalogue is on sale in this country, but we recommend all interested in the manufacturing and scientific advancement of the country to endeavour to procure a copy; because the exhibits demonstrate that, in spite of the keen competition of Germany and other nations, Great Britain can still claim to be high up in brilliant achievements in chemical and allied sciences. F. M. P.

[1] Catalogue of British Exhibits; International Exhibition St. Louis, 1904. Department C, Liberal Arts; Chemical and Pharmaceutical Arts. Issued by the Roya Commission.)

THE LIMNOLOGICAL STATIONS ON THE LAKE OF BOLSENA.

TWO years ago the executive committee of the Italian Geographical Society determined to undertake the desirable work of preparing an exhaustive monograph on one of the lakes of Italy, and they very naturally selected the Lake of Bolsena for the purpose. Its situation within easy reach of Rome,